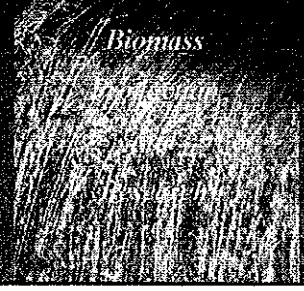
Chariton Valley

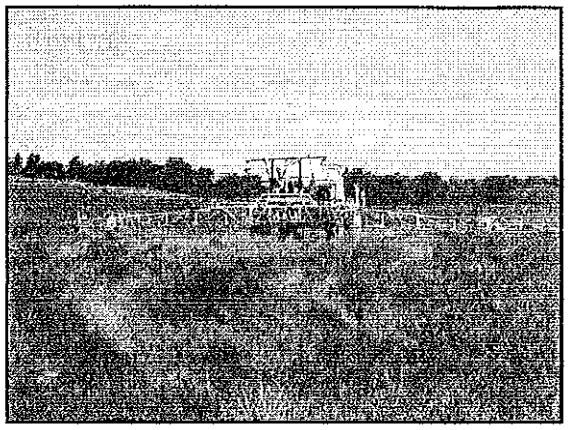
Biomass Project

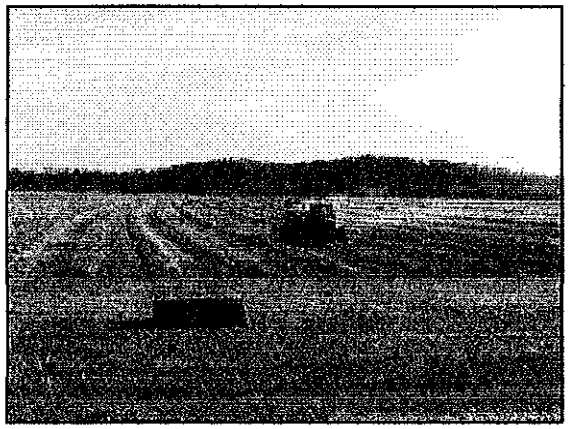
Biomass

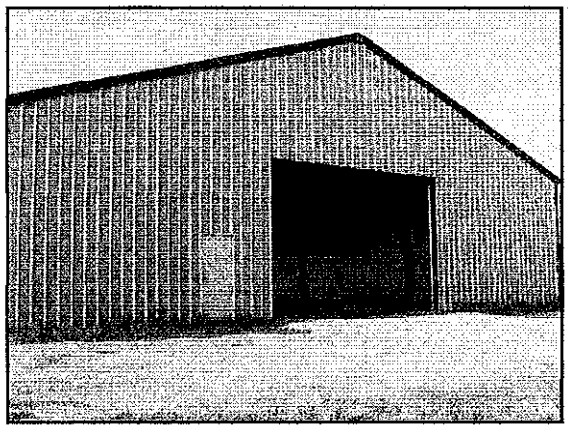


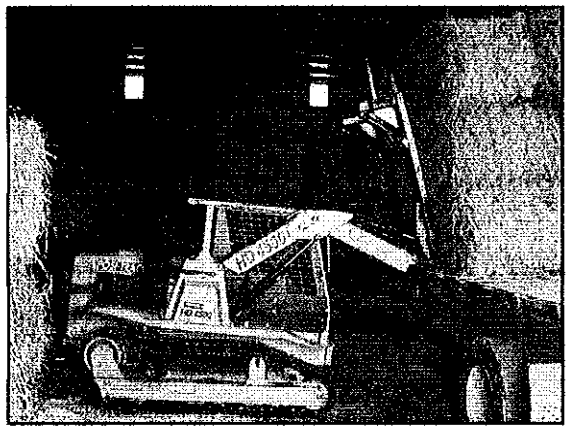
Biomass Production Practices

- *Establishment – seeding rate, frost seeding*
- *Management – weed control, fertility*
- *Harvest – timing, bale type, equipment, and storage*









Economic Analysis

- *Establishment and production budgets for alternative scenarios*
- *Production costs - $49.19 to $66.10 @ farm gate, 4 ton per acre yield*
- *Regional benefits - $12.8 million economic activity and 106 job based on 50,000 acres of CRP to biomass, $50 per ton, 4 tons per acre*

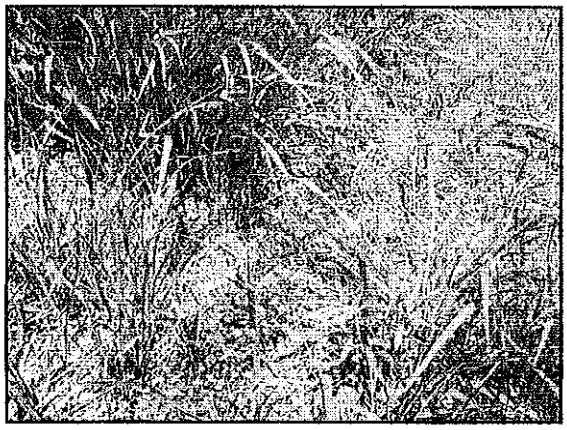
Market Development

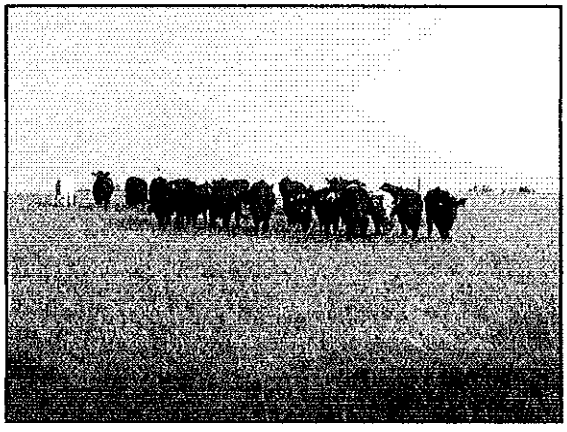
- *Biomass pilot project on land in the Conservation Reserve Program*
- *Tax credit legislation for the production of electricity from biomass*
- *Consumer choice for the purchase of Green Electricity*
- *Technology bands as part of renewable portfolio standards*

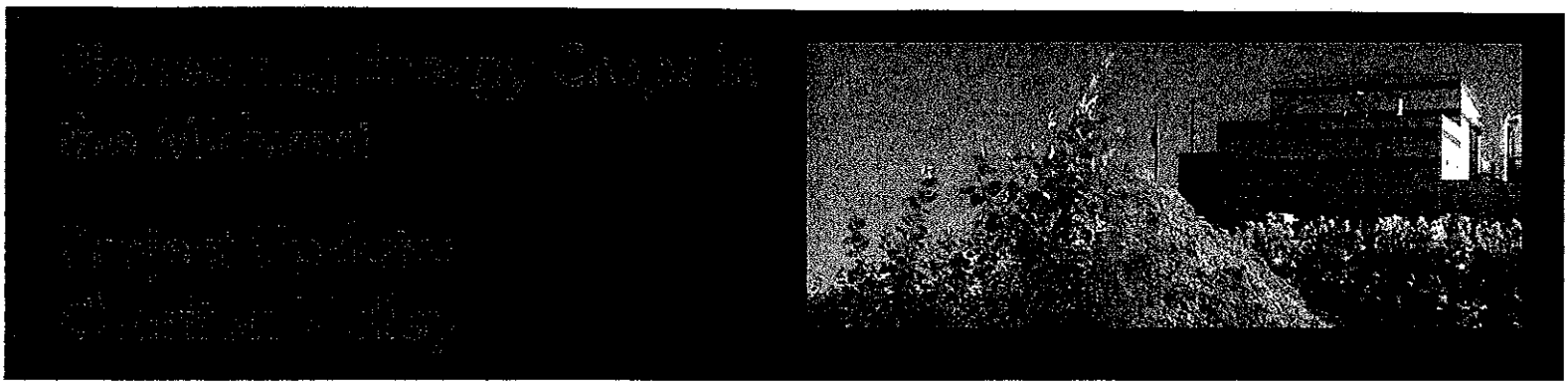
Biomass Cropping Systems

Biomass production with:

- *Hay production – timothy, legumes*
- *Companion cropping – establishment with corn*
- *Grazing*







Switchgrass, a native grass on the U.S. Great Plains, may soon become an important cash crop for producing energy. In late 1996, the U.S. Department of Energy entered into a cooperative agreement with Chariton Valley Resource Conservation and Development (RC&D), Inc., in Centerville, Iowa, to establish markets for energy crops. This effort was started by Southern Iowa farmers in the winter of 1995. The Chariton Valley RC&D is a rural development organization that represents a diverse consortium of public and private partners (listed on the reverse side). The Chariton Valley Biomass Project will transform switchgrass, now grown primarily for erosion control, into an energy cash crop with a value as high as $200 per acre.

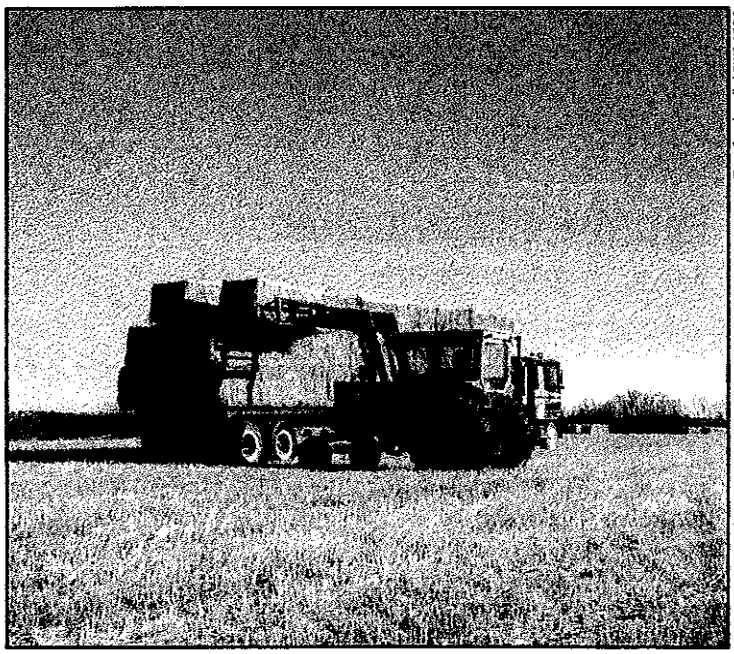
THIS PROJECT DEMONSTRATES A PROCESS CALLED COFIRING THAT BURNS ENERGY CROPS WITH COAL FOR RENEWABLE POWER PRODUCTION ON THE GREAT PLAINS.

Project Goals

The Chariton Valley Biomass Project intends to harvest enough switchgrass to generate 35 megawatts (MW) of power by cofiring with coal at the Alliant Energy Ottumwa Generating Station. This represents 5% of the power plant's capacity of 650 MW, and will require that 200,000 tons of biomass be harvested from 40,000 to 50,000 acres of switchgrass. Eventually, as many as 500 local farmers will have the opportunity to raise and sell the energy crop for power production.

The highlights of this project are:

- Develop 35 MW of generating capacity from biomass by cofiring switchgrass with coal at the Ottumwa Generating Station.
- Research and demonstrate switchgrass gasification for cofiring applications and use in fuel cells.
- Protect water quality in Rathbun Lake in southern Iowa, the source of drinking water for 18 counties and 21 cities, by growing switchgrass on land in the lake's watershed.



Tom Salchwell / PIX06530

Farmers in Southern Iowa are developing the best methods for harvesting switchgrass for cofiring with coal to produce electricity in a local utility power plant.

Project Accomplishments

Substantial progress was made in this project through 1999, including establishing a growers' cooperative and committing 4,000 acres of Conservation Reserve Program (CRP) land to grow switchgrass. CRP is administered by the U.S. Department of Agriculture to reduce soil erosion, protect water quality, and improve wildlife habitat.

- The grower's organization coordinates the management and harvest of switchgrass biomass on 4,000 acres of CRP land.
- Modifications began in 2000 at the Ottumwa Generating Station to allow the cofiring of switchgrass with coal.

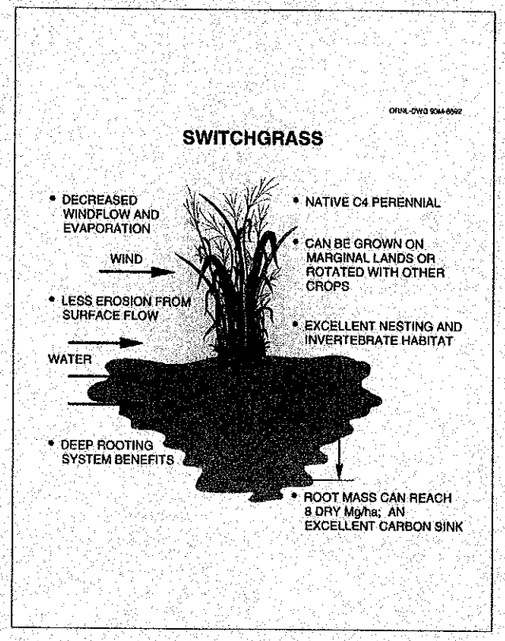
What Lies Ahead

In 2000, participants working on the Chariton Valley Biomass Project will:

- Conduct the first in a series of cofiring test campaigns at the Ottumwa Generating Station with 4,000 tons of switchgrass.
- Design permanent cofiring test facilities based on the results of the 4,000-ton campaign.
- Develop and apply agronomic practices that will optimize the yield and fuel quality of switchgrass grown for biomass fuel.

Chariton Valley Biomass Project

The Chariton Valley Biomass Project is a cooperative effort to develop the biomass energy industry in southern Iowa. Leading the coalition of public and private interests working on the project are Chariton Valley Resource Conservation and Development, Inc., Alliant Energy, and Prairie Lands Bio-Products, Inc., a producer organization. The US Department of Energy and Oak Ridge National Laboratory are principal financial sponsors of the project.



Switchgrass, *Panicum vigatum* a warm season grass native to Iowa, can reduce soil erosion, requires relatively low inputs, grows well on marginal soils, and adds significant amounts of carbon to the soil as a sequestering method or atmospheric CO_2.

Visit our website at www.cvrcd.org

Valley Biomass Project

Wildlife Habitat Study

The wildlife habitat study measures what impact switchgrass harvest may have on wildlife. The field level research is conducted on 21 switchgrass fields.

Water Quality Research

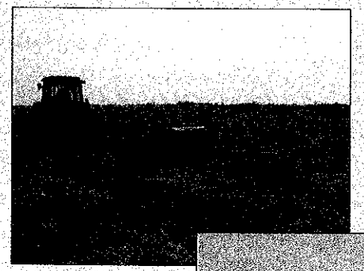
The objective is to better understand the effects switchgrass has on soil erosion reduction. Rain simulations are completed on corn on bean ground, a newly established frost-seeded field of switchgrass, and a well-established switchgrass stand.

Soil Quality and Carbon Sequestration

Soil samples are pulled from newly established switchgrass fields,mature switchgrass stands, and row crop, pasture, and woodlot. The carbon study evaluates the possible benefits of switchgrass on soil physical quality in southern Iowa. Switchgrass can reduce the amount of greenhouse gas emissions that may contribute to global warming.

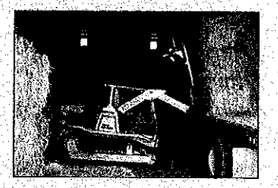
Biomass Project

More than 80 producers have agreed to cooperate with the Chariton Valley Biomass Project. These producers own and manage close to 6,000 acres of land that have been made available to the project for biomass production.



Evaluating differences in yield between early and late season harvest of switchgrass for biomass

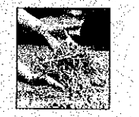
Evaluation of biomass harvest and handling equipment

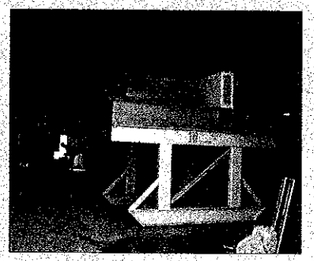


Biomass storage alternatives include the use of tarps on farms and regionally located buildings

The Chariton Valley Biomass Project is sponsored by Chariton Valley RC&D, Inc. in partnership with Alliant Energy. Assisted by: Energy Research Corporation; Iowa Department of Agriculture and Land Stewardship; Division of Soil Conservation; Foster Wheeler Development Corporation; Iowa Department of Natural Resources; Iowa Energy Center; Iowa Farm Bureau Federation; Iowa State University; Iowa State University Extension, Counties of Appanoose, Lucas, Monroe, and Wayne; John Deere Works; Leopold Center for Sustainable Agriculture; National Renewable Energy Laboratory; Oak Ridge National Laboratory; Prairie Lands Bio-Products, Inc.; R.W. Beck; Sega, Inc.; Soil and Water Conservation Districts of Appanoose, Lucas, Monroe, and Wayne Counties; USDA – Farm Service Agency; USDA – Natural Resources Conservation Service; US Department of Energy; and Vermeer Manufacturing Company.

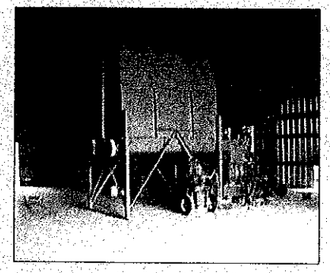
Newhouse debaler prepares bale to be ground





The "Eliminator" grinds the switchgrass

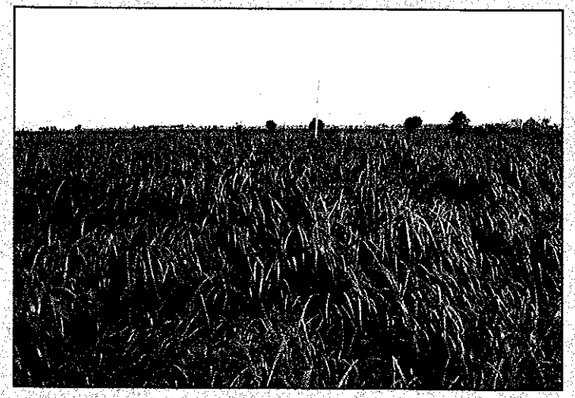
The conveyor moves ground switchgrass from the "Eliminator" to the feed hopper



The feed hopper and rotary air locks prepare switchgrass to be blown to boiler

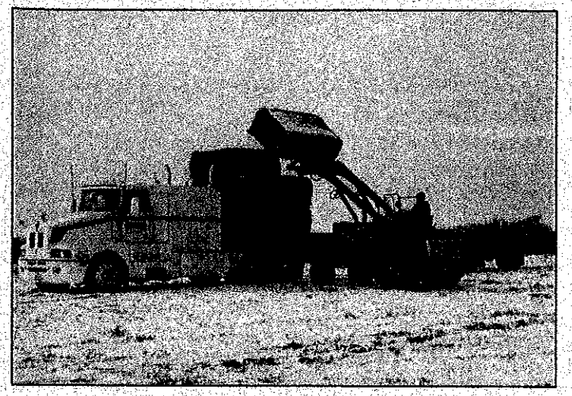
Special nozzles ignite switchgrass as it enters boiler

CHARITON VALLEY BIOMASS PROJECT CO-FIRE TEST 2000



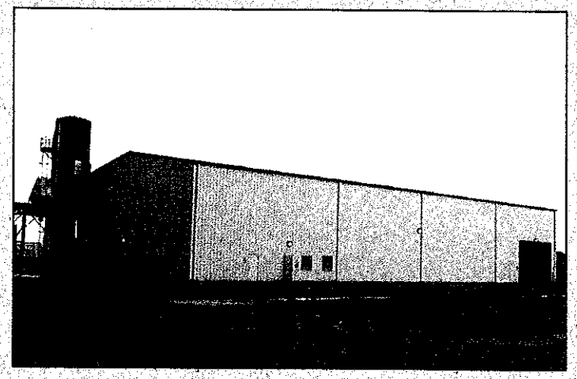
Southern Iowa switchgrass field

Fall harvest



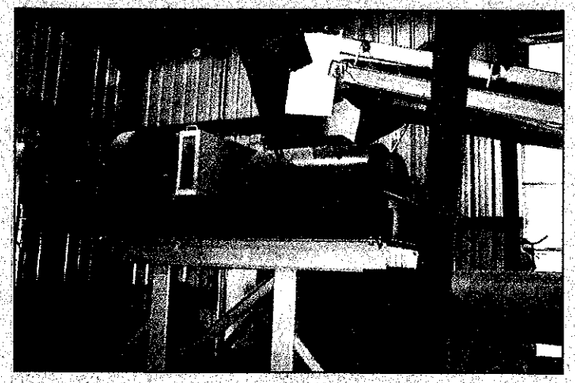
Winter harvest

Switchgrass storage

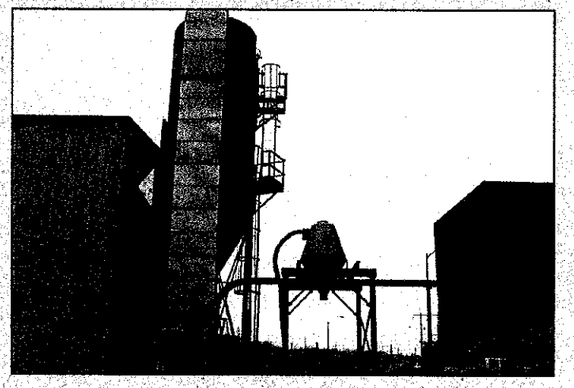


Biomass processing facility, "bio-silo," located at OGS

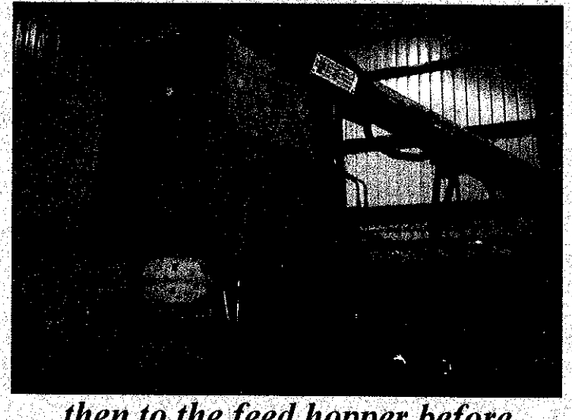
Switchgrass bales are first fed into a debaler…



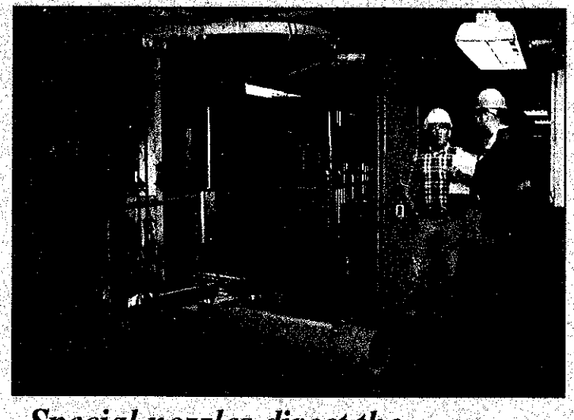
…then transported by conveyor to the "Eliminator" which grinds the switchgrass.



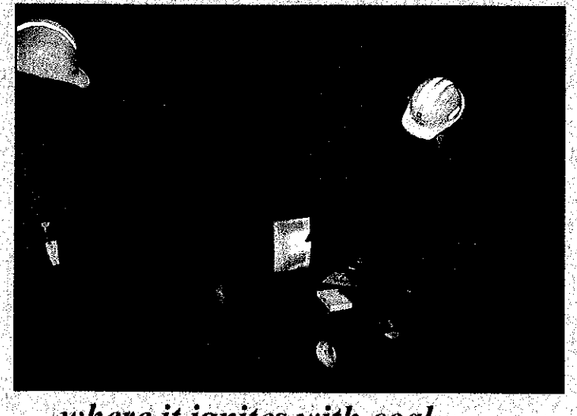
The ground switchgrass moves pneumatically through the bag house….



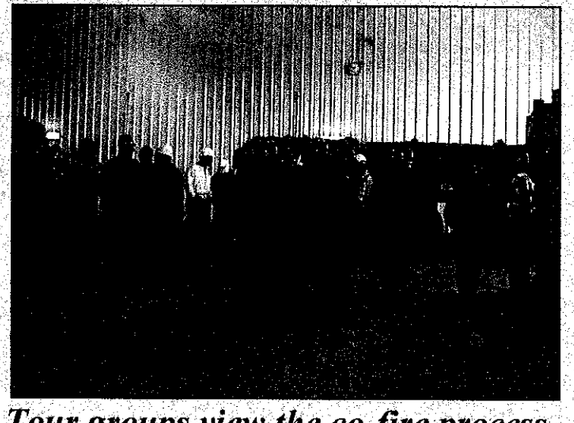
…then to the feed hopper before being sent to boiler.



Special nozzles direct the switchgrass flow into the boiler…



…where it ignites with coal.



Tour groups view the co-fire process.